

Bentley Civil Update and Direction

The cast of characters this year...

- Usual Suspects
 - Mike Wilson – that would be me
 - Joe Waxmonsky – aka “Wax”
 - Rob Nice – calm, cool and relaxed
- Newbies to Denmark but not Bentley Civil
 - Lisa Whitson
 - Jay Vose

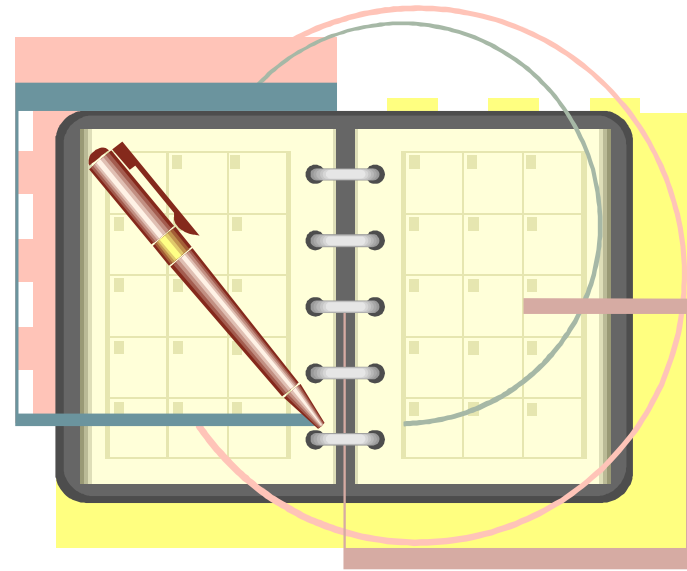
A little different approach this year...

- Let's take a look “down the road”...
- It's time for a change...
- A change for the better, much better...
- A new era of software technology is on the horizon...
- Let's take a look!



Outline

- Where are we today?
- *Model Based Design* paradigm...
- What's coming next?



Outline

- **Where are we today?**
- *Model Based Design* paradigm...
- What's coming next?



Where are we today? - InRoads Today.

- Years of experience building models
- Strong market position of products
- Strong, skilled user base with existing technologies
- Roadway Modeler to Roadway Designer
- Digital Terrain Model with Features

Where are we today? - InRoads Today.

- Comprehensive Geometry
 - Complete Horizontal and Vertical geometry
 - Facilitates Road and Rail geometry
- Intelligent DTM
 - “Intelligent” Features, triangulated and non-triangulated
 - Components
- Roadway Designer
 - Consumer/producer of the above
 - Ultimate corridor design tool

Where are we today? – This is what we hear

- Better geometric representation
- Features represent real world ‘things’
- Features hold / maintain relationships or design intent
- Proprietary aspect to its data/results
 - InRoads must make it to understand it
 - Only InRoads can interpret the meaning
- Features in the DTM carry the important design information



Where are we going? “Civil Platform”

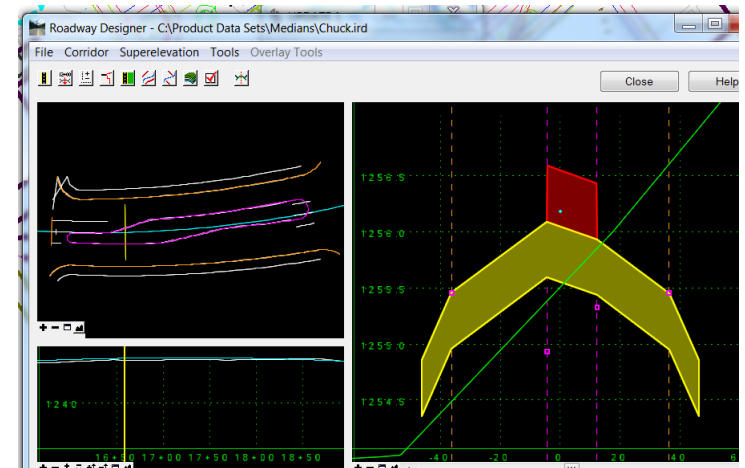
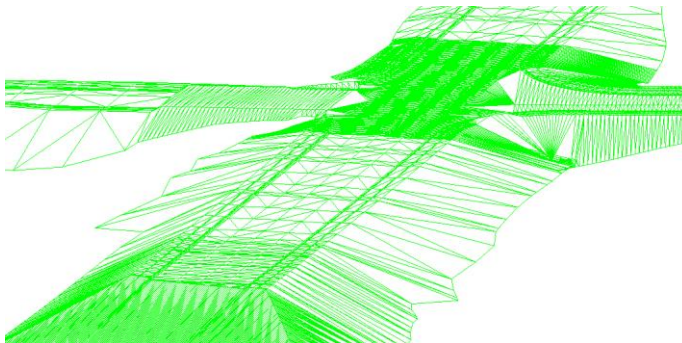
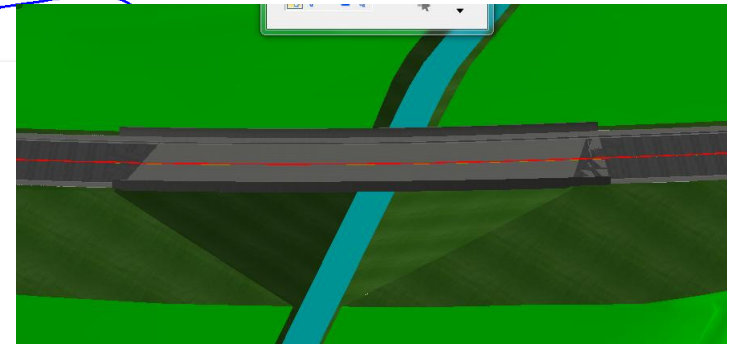
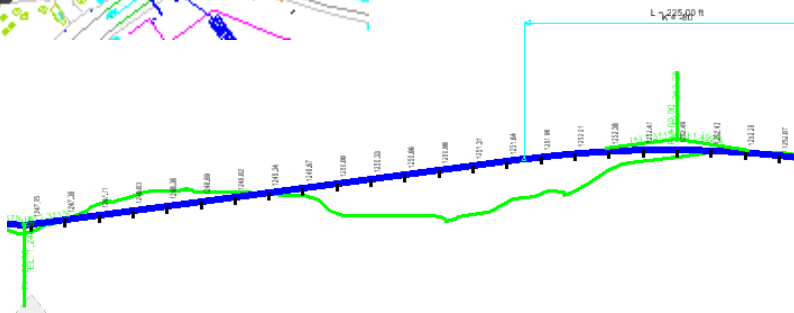
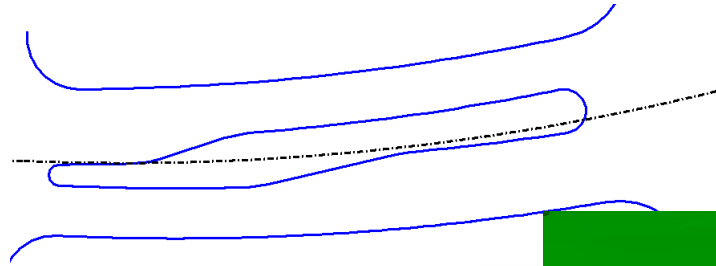
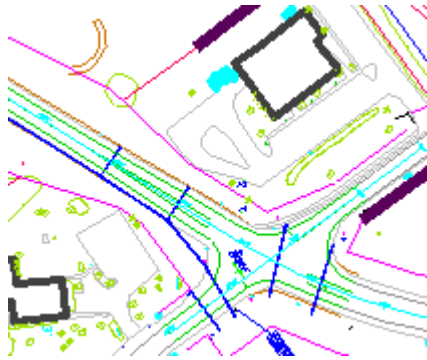
- Builds on 30+ (x3) years of experience in modeling
- Cumulative of the “best” capabilities/practices benefiting from a new architecture
- Enhanced user experience
- Removes proprietary barriers
- Extensible model
- Harness vast Bentley technology



Outline

- Where are we today ?
- ***Model Based Design*** paradigm...
- What's coming next ?

Model Based Design - InRoads Today



How to improve *Model Based Design*?

- True Geometric model
 - Interoperate/Mix any and all types of geometric data (even if we don't make it !)
- Remember Design Decisions
 - Why forget/hide the decisions you get paid to make ?
- Extensible
 - Why do civil software vendors decide what objects and properties are important to you?
- Reviewable
 - Why do we have to know inner workings of a “Civil” application to review/check or understand the models we build?

Outline

- Where are we today?
- *Model Based Design* paradigm...
- **What's coming next?**



“IN” not “ON” MicroStation

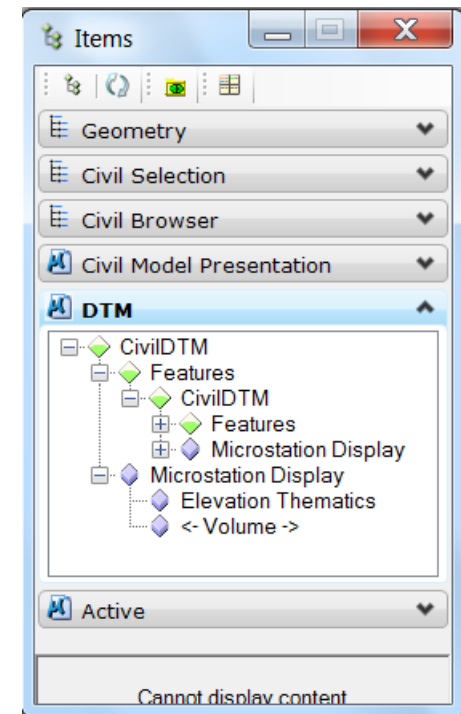
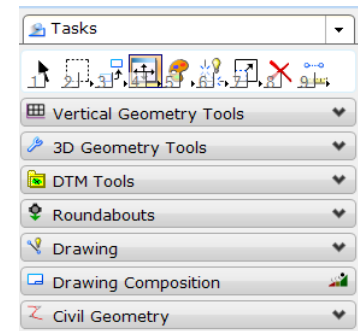
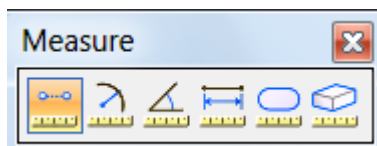
- Maybe one way to explain is to tell what this is NOT.
- Our products are configured in two basic ways
 - Layered Applications – where one installs MicroStation and then installs the application “on top” of MicroStation
 - Power Applications – where the application is bound in a single package with the CAD functionality (MicroStation essentially)
- “IN” vs. “ON” has nothing to do with the above configuration paradigms
- It’s all about how our applications work with MicroStation
- Let me explain...

“IN” not “ON” MicroStation

- I’m running MicroStation!
- Is it MicroStation or Bentley Civil?
- Why “IN”, not “ON”?
- MicroStation User Experience
 - Known workflow, usage, expectations
 - “Flattens” the learning curve
 - Consistency across CAD and application
 - Minimizes the command set/footprint

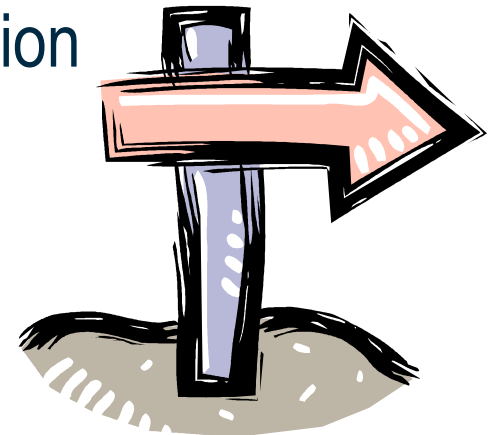
“IN” not “ON” MicroStation

- Use what MicroStation Offers
 - Digital Terrain Model (will discuss later)
 - Integrated Menu System
 - Undo/Redo
 - Measure
 - Measure
 - Proper coordinate system
 - Change Color, Style, etc.
 - Manipulation
 - Browsing capability
 - Reporting



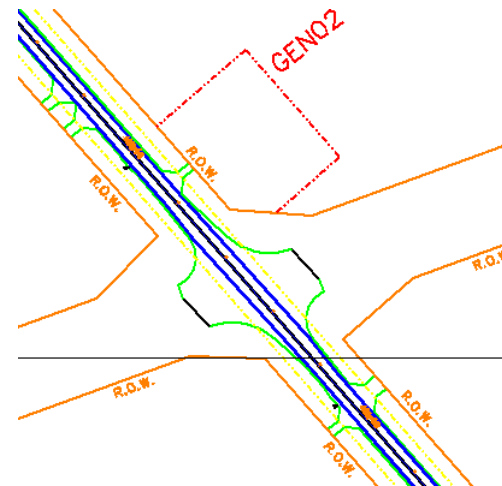
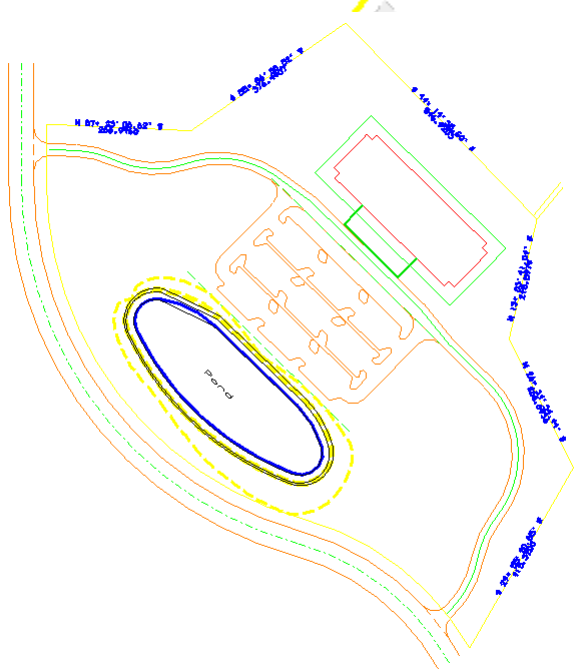
“IN” not “ON” MicroStation

- For clarity...
- This concept is all about how the application integrates and works with MicroStation
- Layered applications can be “IN” MicroStation
- Power applications can be “IN” MicroStation
- Today our applications are “ON” MicroStation
- Our direction is “IN” MicroStation

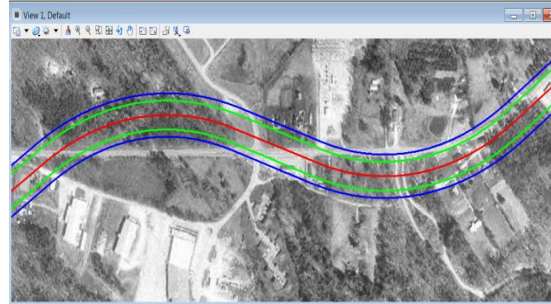


It's just Geometry

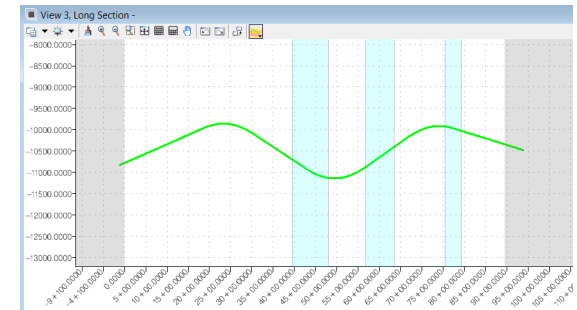
- Alignments...
- Yes...But
- What about the other 99% of your project?



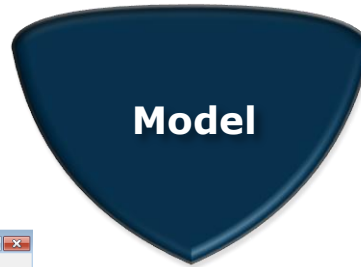
Model Based Design



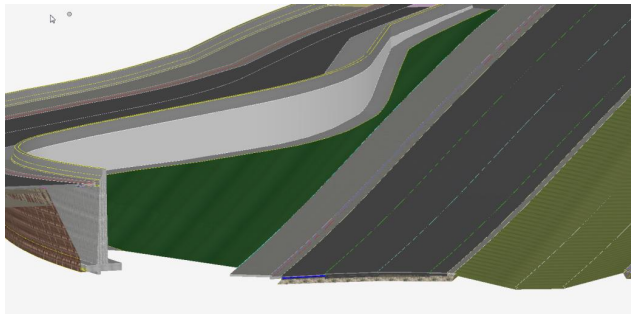
Horizontal Geometry



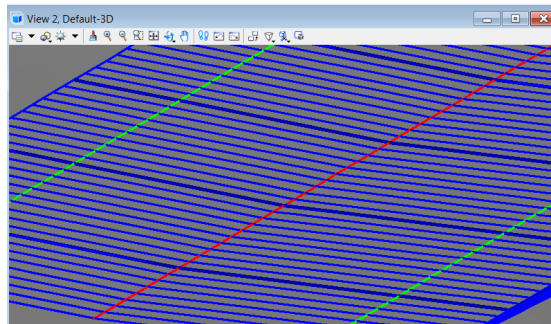
Vertical Geometry



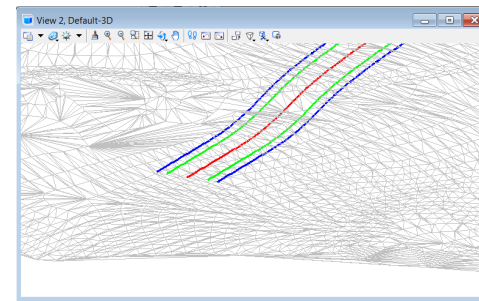
Model



Components (Solids Geometry)



DTM's (Geometry)



3D Geometry

Concepts – “Civil Platform”

- Rules-Based Design
- Captures Design Intent
- Heads-Up Display
- Improved User Experience
- In-place Editing/Manipulation
- Encapsulating “Container”

- UNDO/REDO!!



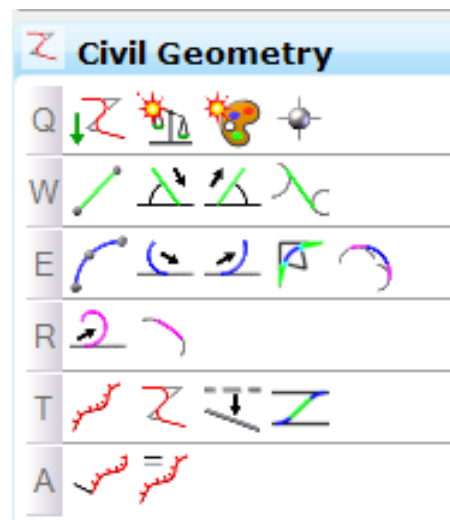
Geometry - Horizontal

- Basic Types

- Line
- Arc
- Spiral

- Construction Methods

- Between Points
- To/From Element
- Between Elements



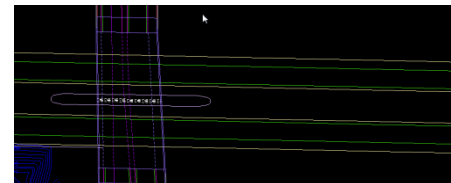
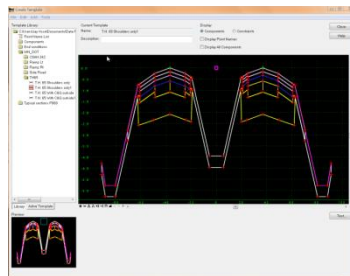
- Integrated into Civil Accudraw
- MS Commands Work

Geometry – Horizontal

- DEMONSTRATION

Geometry - Horizontal

- Build, Save and Reuse Geometry
 - Leads to **Intersections**
- Template Geometry
 - Templates fixed feature definitions to create precise featurized geometry of backbone



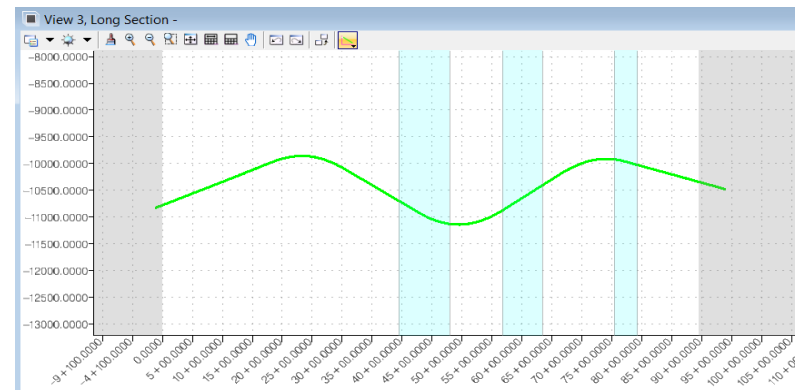
- More commands...

Geometry – Horizontal

- DEMONSTRATION

Geometry - Vertical

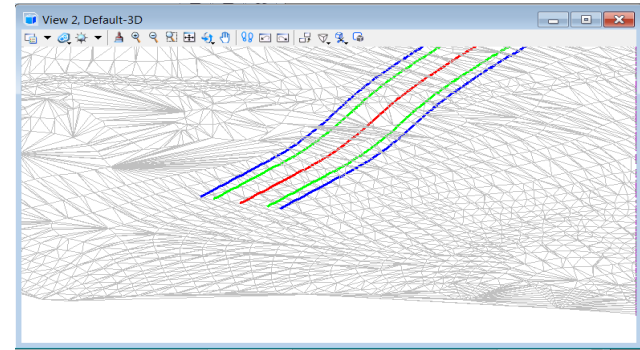
- Basics:
 - Vertical Line
 - Vertical Curves
 - Complex
- Construction Methods:
 - Between points
 - From/To an element
 - Between elements
 - Complex/PI's
- Consistent with Horizontal Concepts



- Managed Profile Views/Models
- Correct Coordinate Systems
- View Exaggeration
- MS Commands work
- Integrated into Civil Accudraw

Geometry - Vertical

Geometry – 3D

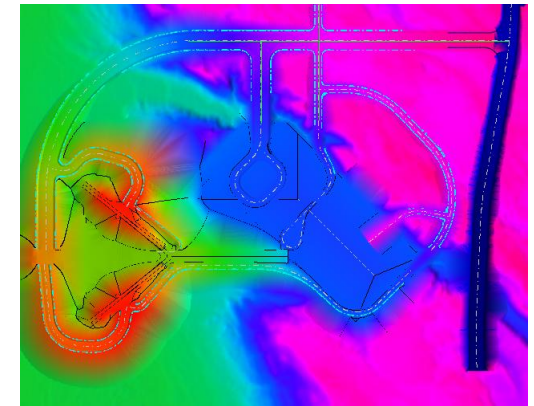
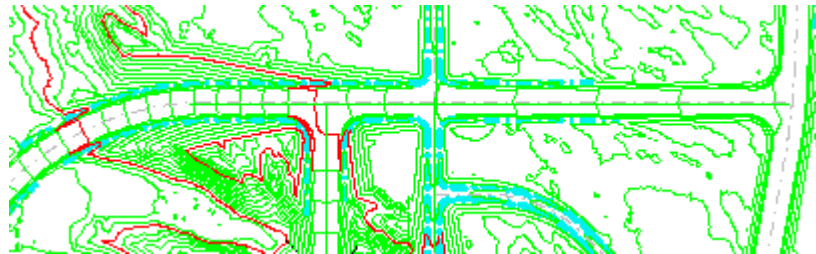


- Horizontal Geometry + Vertical Geometry = 3D (rules based)
- Stroked for 3D but driven by real plan and profile geometry
- All tools (whether traditional “corridor” or “site”-like) all make the same thing, “Geometry” so they can all be combined to form single model.

Geometry – 3D

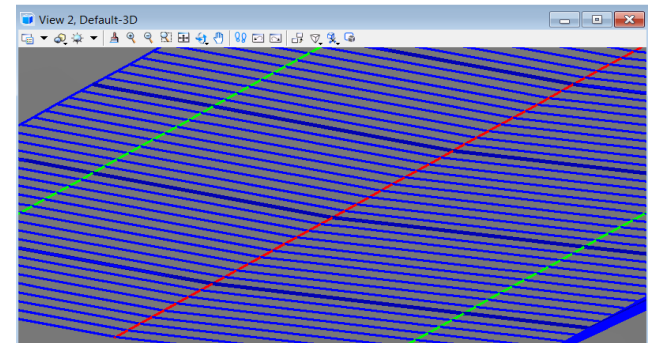
Geometry - DTM

- MicroStation will host the DTM
- Yes, the DTM will become a MicroStation Element
- Basic creation, display and analysis
- Will release in MicroStation next year
- All Bentley Verticals will have access
- All MicroStation users will have access



Geometry - DTM

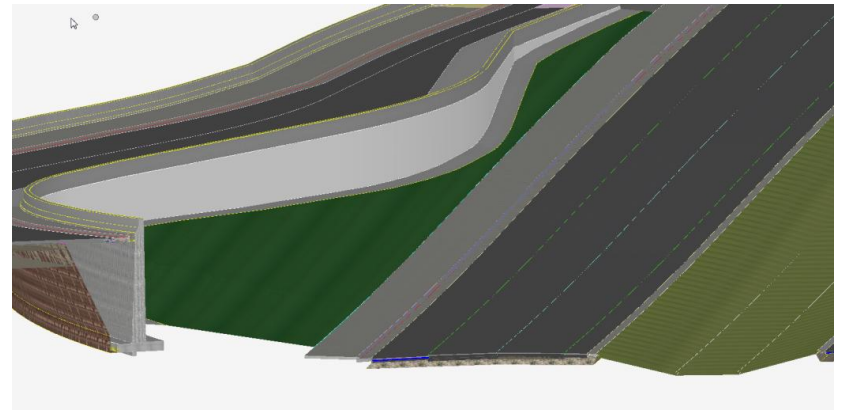
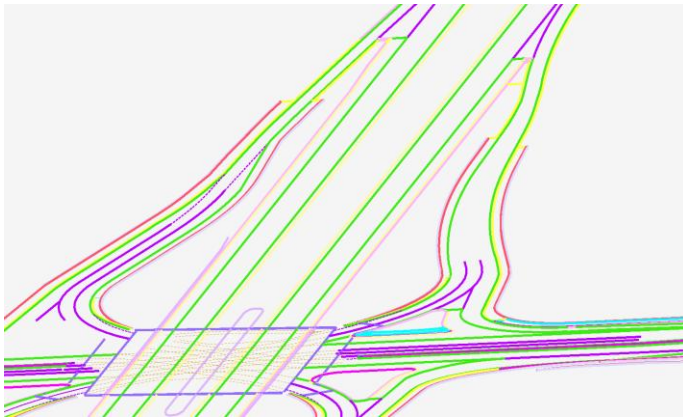
- At this point we have:
 - Horizontal w/rules
 - Vertical w/rules
 - Horizontal + Vertical = 3D, which would imply rules based
- Rule based 3D's = Rule Based DTM's
- Greatly expanding Intelligent DTM
- Bigger & Faster
- Native to MicroStation



Geometry - DTM

Templates & Components

- Horizontal + Vertical = 3D (rules based)
- Apply templates to any geometric feature
- Horizontal + Vertical + DTM + **Components** = 3D geometric Model



Geometry – Template Prototype

Roadway Designer – Continued Evolution

- MicroStation Views
 - This topic is generally centered around the theme of adding MicroStation views to Roadway Designer
- Let's think of it in reverse
 - Let's add Roadway Designer to MicroStation
 - Remember “IN” MicroStation?
- Let's take a sneak preview...

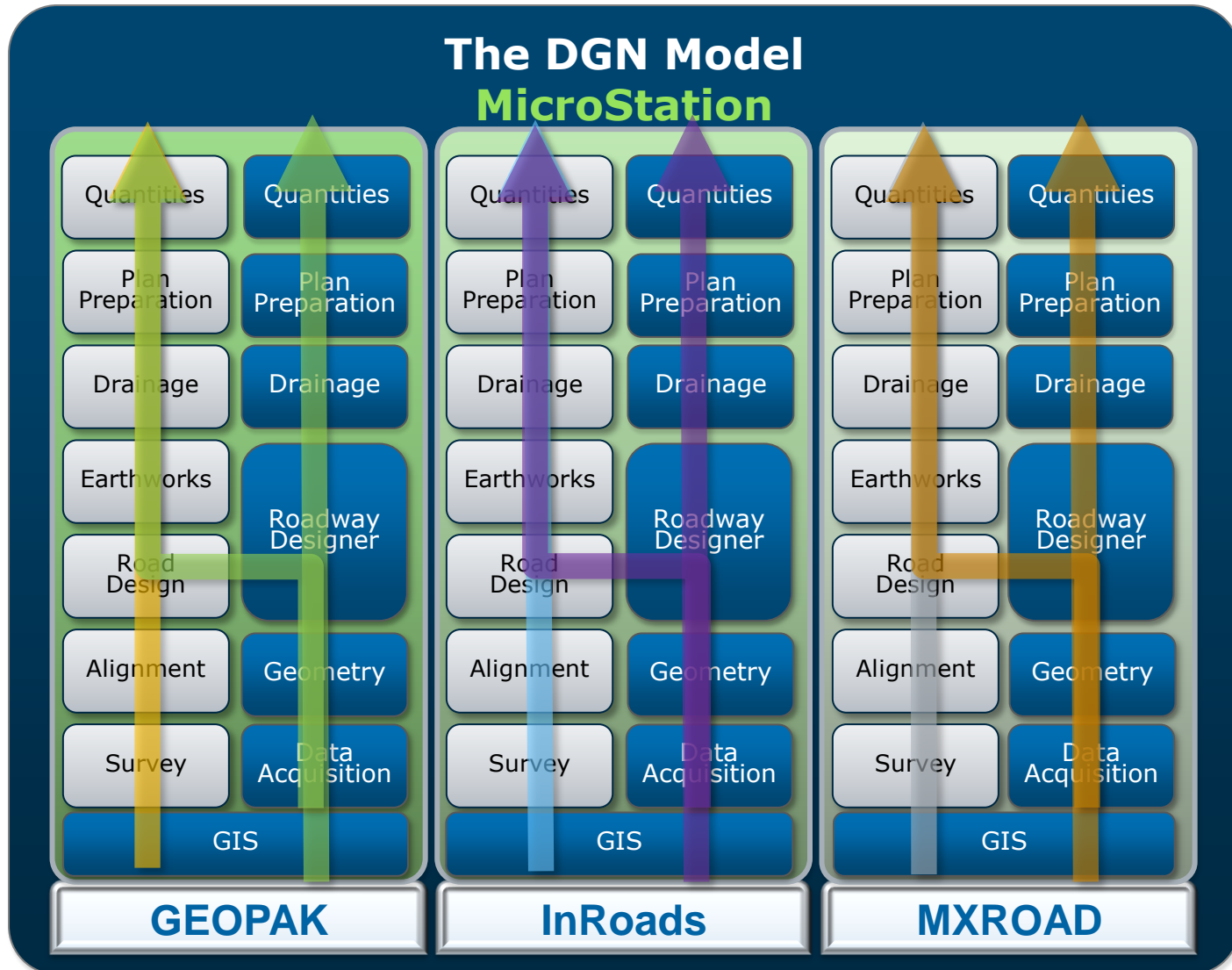
Roadway Designer - MicroStation

Extensible Model

- Customer have always asked to have their own properties on civil features
- These were application specific with tools to create and consume them – can't query, report, or even change outside the application
- Lets open them up – its your data.

Custom Properties

Bentley Civil Evolution



Thanks!